

# Epilepsy and homicide

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**Purpose:** We report the rare case of a patient with intractable epilepsy and escalating aggression, resulting in murder, who had complete resolution of her seizures and explosive behavior following a right temporal lobectomy.

**Patients and methods:** We searched the available literature from 1880 to 2013 for cases of epilepsy being used as a court defense for murder and collected information regarding the final sentencing outcomes. We selected 15 papers with a total of 50 homicides.

**Results:** We describe the case of a 47-year-old woman with drug-resistant right temporal epilepsy who developed increasing emotional lability, outbursts of anger and escalating violent behavior culminating in a violent murder. The patient was imprisoned while awaiting trial. In the interim, she underwent a successful temporal lobectomy with full resolution of seizures, interictal rage and aggressive behaviors. After the surgery, her charges were downgraded and she was transferred to a psychiatric facility.

**Conclusion:** The aggressive behavior associated with epilepsy has been described in the literature for over a century. A link between epilepsy and aggression has been disproportionately emphasized. These patients share some common characteristics: they are usually young men with a long history of epilepsy and lower than average intelligence. The violent act is postictal, sudden-onset, more likely to occur after a cluster of seizures and is usually related with alcohol abuse.

**Keywords:** aggression, crime, epilepsy surgery, murder, temporal lobectomy

## Introduction

Reports of violence and aggression related with epilepsy receive considerable attention in the medical literature. Although aggression associated with epilepsy is well documented, reports of criminal behavior associated with seizure activity are rare. Even though seizure control may be possible with the use of anti-epileptic medications, behavioral symptoms usually persist.<sup>1</sup>

Aggressive behavior in epilepsy patients can be interictal, ictal or postictal.<sup>2</sup> Ictal aggressive behavior is usually resistive, not targeted, stereotyped and more commonly originates from the frontal or temporal regions. More frequently, aggressive behavior occurs during the postictal period.<sup>3,4</sup> Postictal aggression usually occurs when the patient is in a confusional state and manifests as resistive violence when attempts are made to restrain the patient.<sup>3</sup>

Here we report the rare case of a patient with intractable epilepsy and escalating aggression resulting in murder who had complete resolution of her seizures and explosive behavior following a right temporal lobectomy. The patient was charged

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with second-degree murder and was put on trial; however, the patient underwent successful epilepsy surgery with complete resolution of her symptoms, so her charge was downgraded to manslaughter and she was transferred to a psychiatric facility. In this article we review the literature concerning criminal behavior in patients with epilepsy.

## Case report

A previously healthy 40-year-old right-handed female presented with new onset complex partial seizures and occasional secondary generalization. Over the next 5 years, she rapidly became refractory to medical treatment with seizure frequency increasing to almost daily despite attempts to control seizures with multiple anti-epileptic drugs. The patient failed initial monotherapy with valproic acid and progressed to require polytherapy with carbamazepine 600 mg twice a day (BID), lamotrigine 150 mg BID, clobazam 10 mg BID and levetiracetam 1000 mg BID (which was discontinued when the behavioral issues came to light) and yet did not achieve adequate seizure control. Over this same period, the patient developed increasing emotional lability, outbursts of anger and escalating violent behavior coinciding with seizure onset and which was especially worse postictally, lasting 5 to 10 minutes. These explosive episodes led to numerous altercations with police, resulting in multiple arrests for violent behavior. The patient was convicted a total of 32 times prior to the murder for various minor offences and violent incidents, the majority of these occurring in the last 4 years when the patient developed intractable epilepsy. The patient's past medical history was otherwise only remarkable for chronic alcoholism and depression. Although it was offered, the patient repeatedly refused psychiatric evaluation during her disease evolution and was intermittently treated by her family physician for depression with venlafaxine and citalopram.

The patient's neurological exam was normal. She presented with two types of seizures. The most common were complex partial seizures characterized by lack of aura, staring, bimanual and oral automatisms and postictal confusion. The patient was able to talk during some of these seizures. The frequency of these complex partial seizures varied but was on average six per month, with one cluster per month. The patient also had complex partial seizures with secondary generalization (one per month). Several interictal electroencephalograms (EEGs) showed right temporal spikes. Video-EEG telemetry was performed and 6 seizures were recorded; all of them had clear onset over the right temporal region at F8-T4 with involvement of the ipsilateral scalp sphenoidal electrode. One pseudo seizure was also recorded. The magnetic resonance imaging

(MRI) was reported as normal. At this point, the patient was offered a right temporal lobe resection. After discussion with her family, she declined the procedure. Six months after the video-EEG telemetry investigation was performed, the patient had a disagreement with her basement tenant. During this dispute, the patient stabbed her friend several times, killing her. Thus, the patient was arrested and charged with second-degree murder. Unfortunately, the patient is amnesic of the event and there were no other witnesses, so both the duration of the aggressive episode and whether it was preceded by seizure are unknown.

While in jail, the patient and her family wished to revisit the possibility of neurosurgery. At age 46, the patient underwent a standard right temporal lobectomy, twelve months after the video-EEG telemetry investigation. The patient remained in hospital for two weeks post-operatively and was then transferred back to prison. After six months in a maximum security facility, she was transferred to a psychiatric center due to the noted positive behavior change. At two years post-surgical follow up, the patient reported no seizure activity and was on monotherapy with carbamazepine 400 mg BID. The patient's behavior improved dramatically after the temporal resection with no evidence of emotional lability or aggressive outbursts since.

## Neuropsychological findings

This patient was administered a standard battery of neuropsychological tests, assessing the domains of attention, working memory, language, learning and memory and psychological/emotional functioning, on two separate occasions. Her first neuropsychological assessment occurred about 22 months prior to neurosurgery and indicated significantly compromised cognitive functioning, with difficulties most evident on tasks assessing verbal comprehension, working memory and learning of novel material, particularly if the material was visual in nature. She still demonstrated good reasoning and problem solving skills, and adequate learning if provided with an opportunity to first deal with hands-on material. She was also experiencing significant levels of psychological distress due to the limitations imposed by her seizure disorder. The second neuropsychological assessment was undertaken about 15 months post neurosurgery and indicated that this patient was no longer psychologically distressed as she was no longer experiencing seizures. However, her neuropsychological profile indicated that she had experienced further global decline in cognitive functioning with marked impairment and limited function. This decline was attributed to the

longstanding history of epilepsy, but could also be partially due to the resection.

## Discussion

We describe the case of a young woman with medically refractory epilepsy that developed increasing emotional lability, outbursts of anger and escalating aggressive behavior culminating in a violent murder. Our patient underwent a temporal lobectomy with complete resolution of the seizures, anger and violence.

We have reviewed all the available cases reported from 1880 to 2013 using Medline, Index medicus, Cochrane database and bibliographies of pertinent reviews and original articles using the following search terms: epilepsy, aggression, violence, criminal, crime, criminality, law, legal, murder, homicide, matricide, epileptic automatism, epileptic furor, epileptic equivalent, larvate epilepsy and rage. Of 178 citations identified, 46 potentially eligible articles were reviewed in full text. From these, we found 30 articles reporting 176 original cases of various aggressive behaviors in patients with epilepsy. We selected only those case reports and case series of epileptic patients that committed murder and were placed on trial. 50 murder cases were included (Table 1). The largest available series in the literature was that of Treiman,<sup>7</sup> who reported 75 crimes of violence in which epilepsy was used as a defense. From this review we selected 31 patients with a clear history of epilepsy before the crime.

In our review, 86% of patients were males. The mean age of patients was 31.5 years (range 19–52). In 58% of cases, the type of epilepsy was not specified. 30% had focal epilepsy and 12% had generalized epilepsy. In the group of patients with focal epilepsy, 80% had temporal epilepsy and 20% frontal epilepsy. Our case is unusual because the patient is a female, in contrast to the predominance of males in the majority of reports in the literature, although is similar in the reported age group and in the type of epilepsy (focal-temporal). In our review we could not find any evidence of lateralization associated with aggressiveness. Our patient is only the second case reported in the literature about a temporal lobectomy being curative for aggression resulting in murder. Only Walker<sup>1</sup> reported a patient who underwent a left temporal lobectomy after committing murder in a state of postictal aggression. Similar to our case, this patient improved after surgery with fewer seizures and less aggressive behavior.<sup>1</sup>

Regarding the timing of the violent event with respect to the seizure, our review shows that 39 patients (78%) did not

have a clear temporal relation between the violent behavior and seizure. In only 11 patients (22%) did the violent episodes have a clear temporal relationship to the seizures. In 9 of 11 patients (82%) the violent episodes occurred in the postictal period, one in the ictal period (9%) and the last one in the interictal period. In our patient, the violent act was not clearly related with a seizure (interictal), but we cannot rule out a seizure immediately preceding the event. In a larger series, Gerard et al<sup>8</sup> describe six patients with targeted aggression similar to that of our patient. In these patients, postictal violence was intentionally directed towards an individual or an object.<sup>8</sup> Ito et al<sup>4</sup>, Marsh et al<sup>3</sup> and Akuffo et al<sup>10</sup> have described a different, more common pattern of postictal behavior: that of resistive violence.<sup>3,4,10</sup> In these patients, the violence is passive and undirected, occurring in the form of resistance at attempts at restraint. This pattern was also seen in our patient during previous attempts at arrest by police. In the majority of reported cases, the victim is a family member (50%), usually the wife (60%).<sup>1,7,11–13,15</sup> Of the 7 women we found who committed an aggressive act,<sup>3,7,16</sup> 60% of these were committed against family members, either against their baby<sup>3</sup> or husband.<sup>7</sup> Our patient attacked a non-family member, which occurs less frequently, but likely represents the fact that family members are often physically closest to the patient during the ictal/postictal period.

Of note is the ferocious and excessive nature of the violence in these cases. Our patient stabbed her victim multiple times with a kitchen knife. We found 5 similar cases of vicious murders in which the aggressor inflicted more injuries than required to kill the victim.<sup>1,7,13</sup> In one report, a woman was stabbed 42 times with butcher knife, hatchet, and sharpened screwdriver.<sup>7</sup> Another case outlines a woman who was stabbed 30 times in the chest and back.<sup>1</sup> These violent episodes can be precipitated by alcohol ingestion or stressful situations.<sup>10,17</sup> In two separate series, 50% and 65% of patients were intoxicated before the crime.<sup>2,18</sup> Our patient's history is significant for alcohol abuse, and she had been drinking prior to the event, although it is unknown whether she was intoxicated, and the altercation occurred after an arguably stressful situation. After reviewing the literature, a pattern emerges regarding the characteristics of people with epilepsy who commit violent crimes: they are usually young adults, males, with low average intelligence and a history of behavioral difficulties starting commonly in childhood.<sup>8,19</sup> The aggressive episodes are stereotyped and repetitive, more common in the postictal period, occur more frequently after a cluster of seizures and in patients with focal epilepsy (Table 2).<sup>8</sup>

**Table 1** Case reports of people with epilepsy who committed murder and were placed on trial

Author	# of patients in study	Gender/age	Epilepsy	Time	Offense	Charge	Final disposition
Yellowlees <sup>5</sup>	1	M/27	NSE	PI	Assaulted and kicked his jail cell neighbor to death	Homicide	AFI and CMH
Lennox <sup>6</sup>	1	M/22	NSE	NSP	Beat his aunt to death, took her money, placed her body in his car and drove from a suburb, where he bludgeoned the body	Homicide	IJ
Walker <sup>1</sup>	2	M/48	BT	PI	Killed his wife with 30 stab wounds in the chest and two in the back. He underwent left temporal lobectomy	Homicide	AFI and CMH
Fenton <sup>11</sup>	1	M/52	NSE	NSP	After a heated discussion, killed his wife and put her body on the side of a road and covered it with her coat	Homicide	AFI and CMH
Gunn <sup>12</sup>	2	M/28 M/32	BT G	NSP PI	Repeatedly struck his wife over the head with a hammer, killing her. Subsequently he attacked his daughter, striking her on the head Heard about his wife's infidelity and strangled her	Manslaughter Homicide	AFI and CMH AFI and CMH
Brewer <sup>9</sup>	1	M/24	RT	NSP	Violently kicked and assaulted an elderly man with a spade. The man died of severe head injuries 6 days later	Homicide	AFI and CMH
Gunn <sup>13</sup>	1	M/48	RT	NSP	Shot and killed his aunt and uncle using a single-barrel nonrepeating shotgun and five shells, each of which had to be loaded individually	Manslaughter	IJ
Treiman <sup>7</sup>	31	87% M/30 Mean age	23% F 10% G 67% U	87% NSP, 13% PI	Killed his wife by hitting her over the head with a hammer. Autopsy revealed at least seven blows had been delivered with a claw hammer Victim: non family member 52%, family member 35%, NI 13% Violent act: shooting 29%, stabbing 23%, hitting 19%, NI 16%, others 13%	FDH: 42%, SDH: 13%, TDH: 3%, Manslaughter: 19%, Homicide without classification: 23% Manslaughter	IJ: 81% AFI and CMH: 19%
Hindler <sup>6</sup>	1	F/19	G	I	Grabbed a 20-month-old infant by the leg and hit him against a cabinet and the floor. The episode was precipitated by the baby's laughter. The baby died 8 days later	Manslaughter	AFI and CMH
Akuffo <sup>10</sup>	1	M/46	LT	NSP	During a heated argument, fatally injured his mother by striking her over the head with a heavy bottle. He then sat in front of the television for over 3 hours before going to the police	Manslaughter	AFI and CMH
Yadeum <sup>14</sup>	1	M/31	T	PI	Stabbed a man that sat in a chair in front of him. He described a strange feeling like a "necessity to kill him"	Manslaughter	AFI and CMH
Treiman <sup>22</sup>	2	M/47	NSE	NSP	Shot a 15 year old boy in the head without provocation. The patient had no prior history of epilepsy	SDH	AFI and CMH
Marsh <sup>3</sup>	2	M/37 F/29	RT G	NSP II	Murdered a 17 year old girl with a knife. He waited for her to come home from school, and after hid her body in the garage then washed the knife Drowned her baby in a bathtub. While bathing the infant in a bathtub, she found herself bruised and confused on the floor of the bathroom. She was horrified to find the infant drowned	Homicide Homicide	CMH AFI and CMH
		F/19	NSE	NSP	One month post-partum, she was found confused at home without the infant. While a deputy was in the house, a relative discovered the baby in the microwave oven. He was deceased, and folded over with multiple burn injuries	FDH	IJ

Weiss <sup>15</sup>	2	M/? M/26	NSE NSE	NSP NSP	Killed his wife inside his house Cut the throat of a 63 year old woman and then stabbed her. He adamantly denied the charges	Homicide Homicide	AFI and CMH IJ and executed AFI and CMH
Reuber <sup>18</sup>	1	M/not described	NSE	PI	Surprised while attempting to steal money from neighbor's electricity meter. He killed his neighbor with the pry tool used to open the meter	Homicide	AFI and CMH

**Abbreviations:** NSE, non-specified type of epilepsy; BT, bi-temporal; LT, left temporal; RT, right temporal; T, temporal; G, generalized; F, focal; U, unknown; NSP, non-specified pattern; PI, postictal; II, interictal; I, ictal; NI, no information; FDH, first degree homicide; SDH, second degree homicide; TDH, third degree homicide; AFI, acquittal for insanity; CMH, conviction in a mental hospital; IJ, imprisonment-jail.

**Table 2** Previously identified characteristics of patients with epilepsy who commit violent acts as compared to those who do not

#### Patient

- Male/young age (between 20 and 50 years).<sup>7,19,20</sup>
- Seizure onset at childhood or adolescence.<sup>7</sup>
- Refractory epilepsy.<sup>7,8</sup>
- Presence of organic cerebral disease evident on neurological examination.<sup>20</sup>
- Behavior difficulties in school.<sup>20</sup>
- Lack of mental maturity on psychiatric evaluation.<sup>20</sup>
- Unemployed in past 3 years.<sup>18,20</sup>
- Attended church less frequently.<sup>20</sup>
- Learning disability, low IQ.<sup>2,7</sup>
- Low socioeconomic status.<sup>2</sup>
- Psychiatric comorbidity including depression, obsessive disorder, psychosis.<sup>18</sup>

#### Violent act features

- Occur suddenly, without evidence of planning.<sup>17</sup>
- Short-lived, fragmentary, and unsustained episodes.<sup>8,17</sup>
- Stereotyped aggressive events.<sup>3</sup>
- Occur after severe stress.<sup>10,19</sup>
- Can occur hours or days after a seizure.<sup>8</sup>
- Usually after cluster of seizures.<sup>8</sup>
- Partial amnesia of event.<sup>4,19</sup>
- Remorse after episode.<sup>4,8,19</sup>
- Recurrent episodes of violence.<sup>8</sup>
- Related with alcohol abuse.<sup>2,19</sup>

**Note:** The lower half of the table outlines the key features of the violent act itself.

With regards to the legal situations in these cases, our review shows that 72% of patients were initially charged with homicide, and 22% with manslaughter. After trial, 62% of patients were convicted of homicide and 38% were found not criminally responsible for their actions (insanity plea) and were discharged to a psychiatric facility for hospitalization. The eminent British psychiatrist Henry Maudsley suggested that, “when a murder has been committed without apparent motive and the reason of it seems inexplicable, it may chance that the perpetrator is found on inquiry to be afflicted with epilepsy”.<sup>21</sup> Put into the context of our case, our patient’s charge was downgraded from second-degree murder to manslaughter as epilepsy may have been the inciting event. Using her disease as a defense allowed our patient to be moved from a high security prison to a psychiatric center for appropriate treatment.<sup>15,22</sup>

The higher risk of violent crimes in patients with epilepsy has not been demonstrated in many studies. In a Swedish epidemiological study, patients with epilepsy did not have an increased risk of violent crimes compared with the general population.<sup>23</sup> Accordingly, epilepsy and criminality is rarely reported. Reuber et al reported a series of 13 cases identified between 1975 and 2001 in the UK that were found “not guilty

**Table 3** International criteria to determine whether a violent crime was the result of an epileptic seizure**International panel criteria<sup>17</sup>**

1. The diagnosis of epilepsy should be established by at least one neurologist with special competence in epilepsy
2. The presence of epileptic automatism should be documented by the clinical history and video-EEG
3. The presence of aggression during an epileptic automatism should be verified in a video-recorded seizure in which ictal epileptiform patterns are also recorded on the EEG
4. The violent act should be characteristic of the patient's habitual seizures
5. A clinical judgment should be made by the neurologist, attesting to the possibility that the act (the alleged crime) was part of a seizure

**Abbreviation:** EEG, electroencephalogram.

by reason of insanity because of epilepsy".<sup>18</sup> Charges included murder (1), attempted murder (1), assault (7), arson (2), abduction/kidnapping (3) and burglary (1).<sup>18</sup> 93% were males, 84.6% had psychiatric comorbidity and 69% had a previous criminal offence. A total of 61.5% of offenses were committed in a state of alcohol intoxication. Psychotic symptoms may have been present when the offenses were committed in 52.8% of cases. Over two-thirds of offenses probably occurred during the postictal period.<sup>18</sup>

Few studies have proposed specific criteria to determine whether a violent crime was the result of an epileptic seizure. Delgado-Escueta et al assessed 33 events of aggressive behavior during seizures in 19 patients recorded on video-EEG.<sup>17</sup> After analysis of the spells, the international team of epileptologists noted some common characteristics: all aggressive acts occurred suddenly, without evidence of planning, and lasted an average of 29 seconds. All occurred during complex partial seizures. All patients were easily restrained, and automatic acts were short-lived, fragmentary and unsustained.<sup>17</sup> This international panel developed a set of five criteria to determine whether an aggressive act was the result of an epileptic seizure (Table 3). Although we never documented aggressiveness during the video-EEG investigation in our patient, the rest of the criteria were fulfilled.

## Conclusion

Aggressiveness related with epilepsy has been well described in the literature for more than a century. These patients share some common characteristics: usually are young men with a long history of drug-resistant epilepsy and lower than average intelligence. The violent act is postictal, usually occurs after a cluster of seizures, is of sudden onset and is related with stressful situations and alcohol abuse. Our case is unique

because the patient had interictal aggressiveness, probably related with temporal epilepsy, that markedly improved after epilepsy surgery. To our knowledge, there is only one other published case in the literature in which an epileptic patient's aggressive behavior improved after surgical resection of the epileptogenic lesion. It is unclear if our patient had a seizure before the incident that could have potentially triggered the abnormal behavior. Our case is also unique because the defense lawyer was able to use the patient's medical condition and the positive outcome post-surgery as a defense to downgrade the charges against the patient.

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## Disclosure

The authors report no conflicts of interest in this work.

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